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(54) **COMPUTER-IMPLEMENTED CALL FORWARDING OPTIONS AND METHODS THEREFOR IN A UNIFIED MESSAGING SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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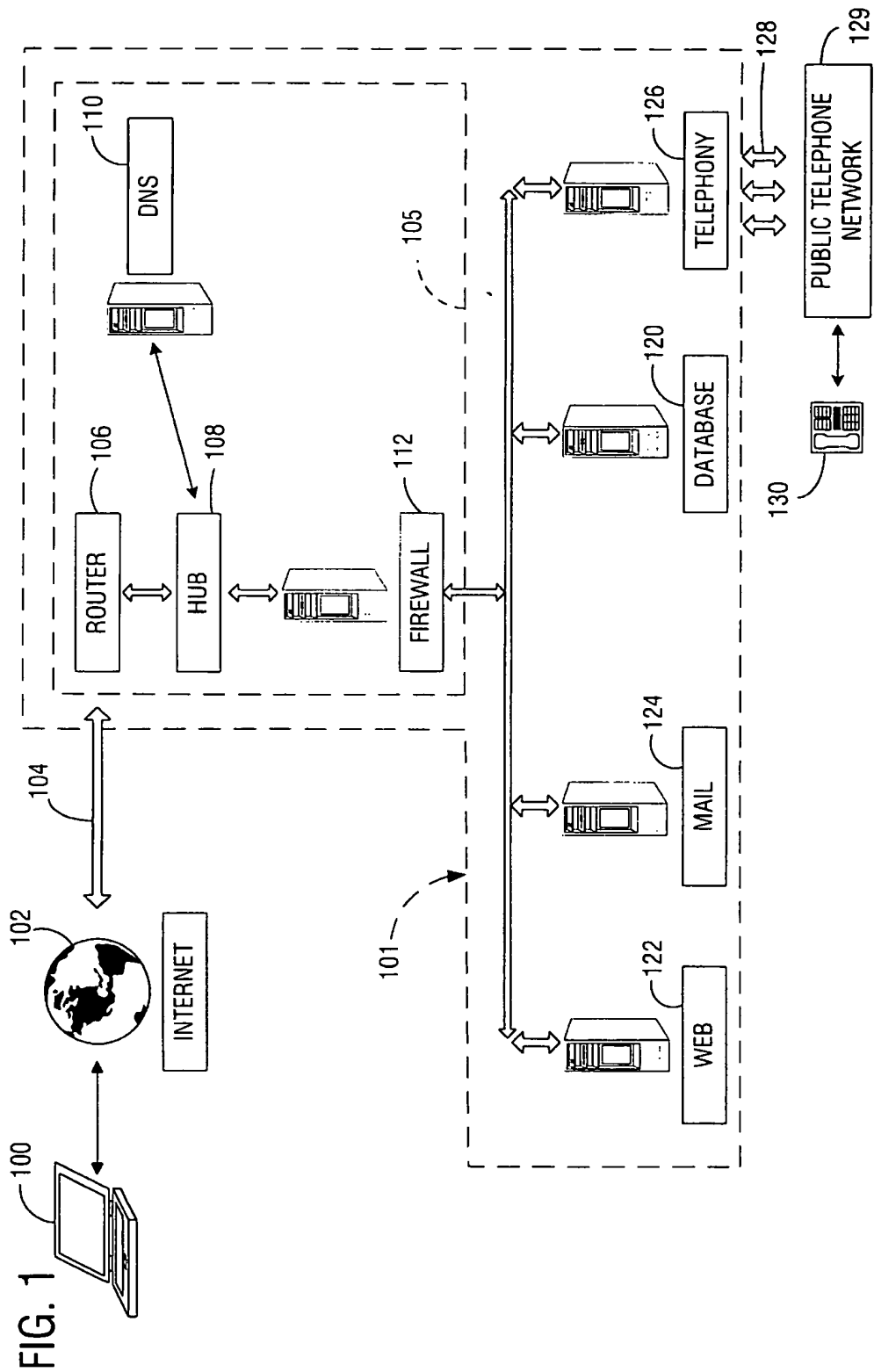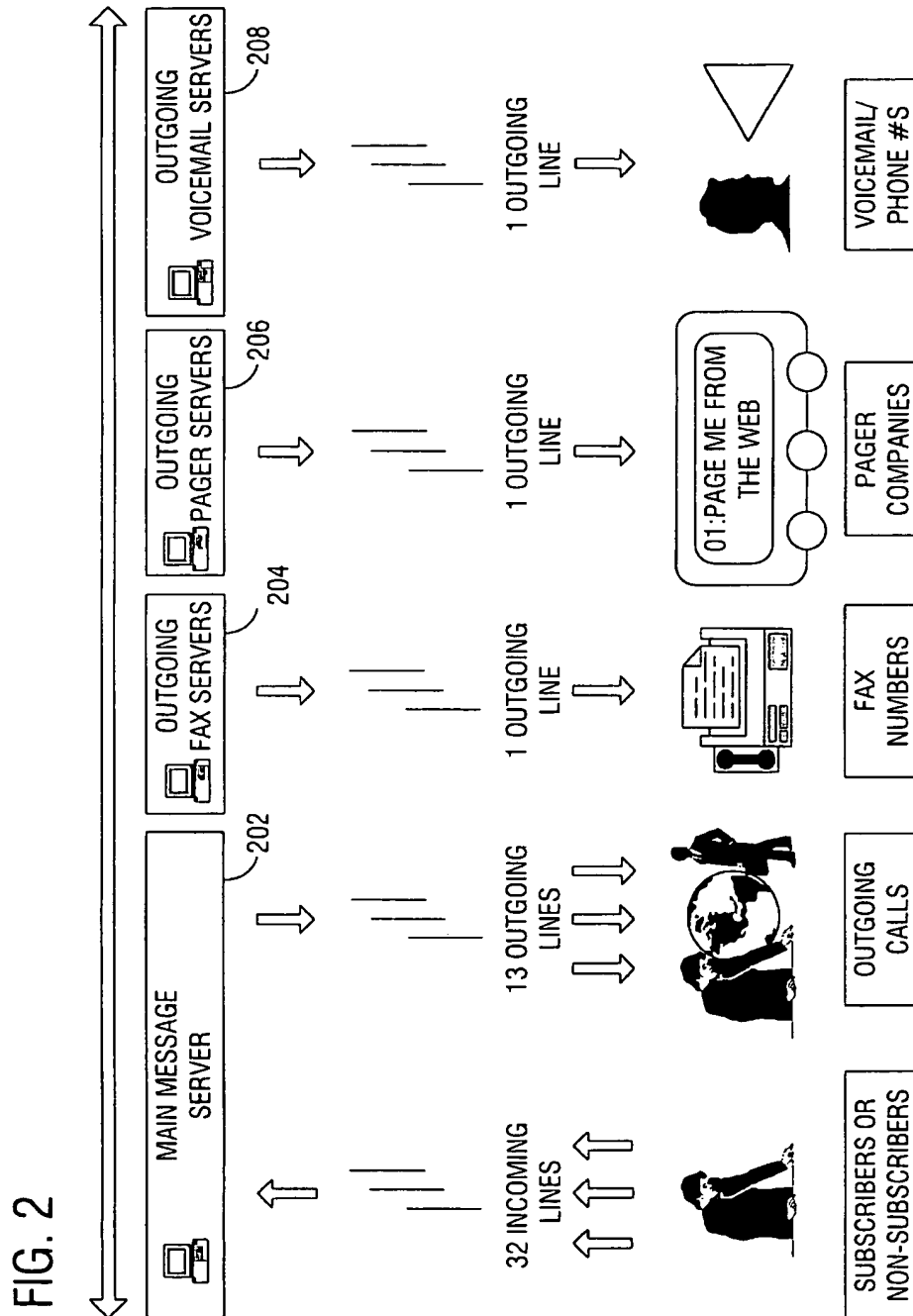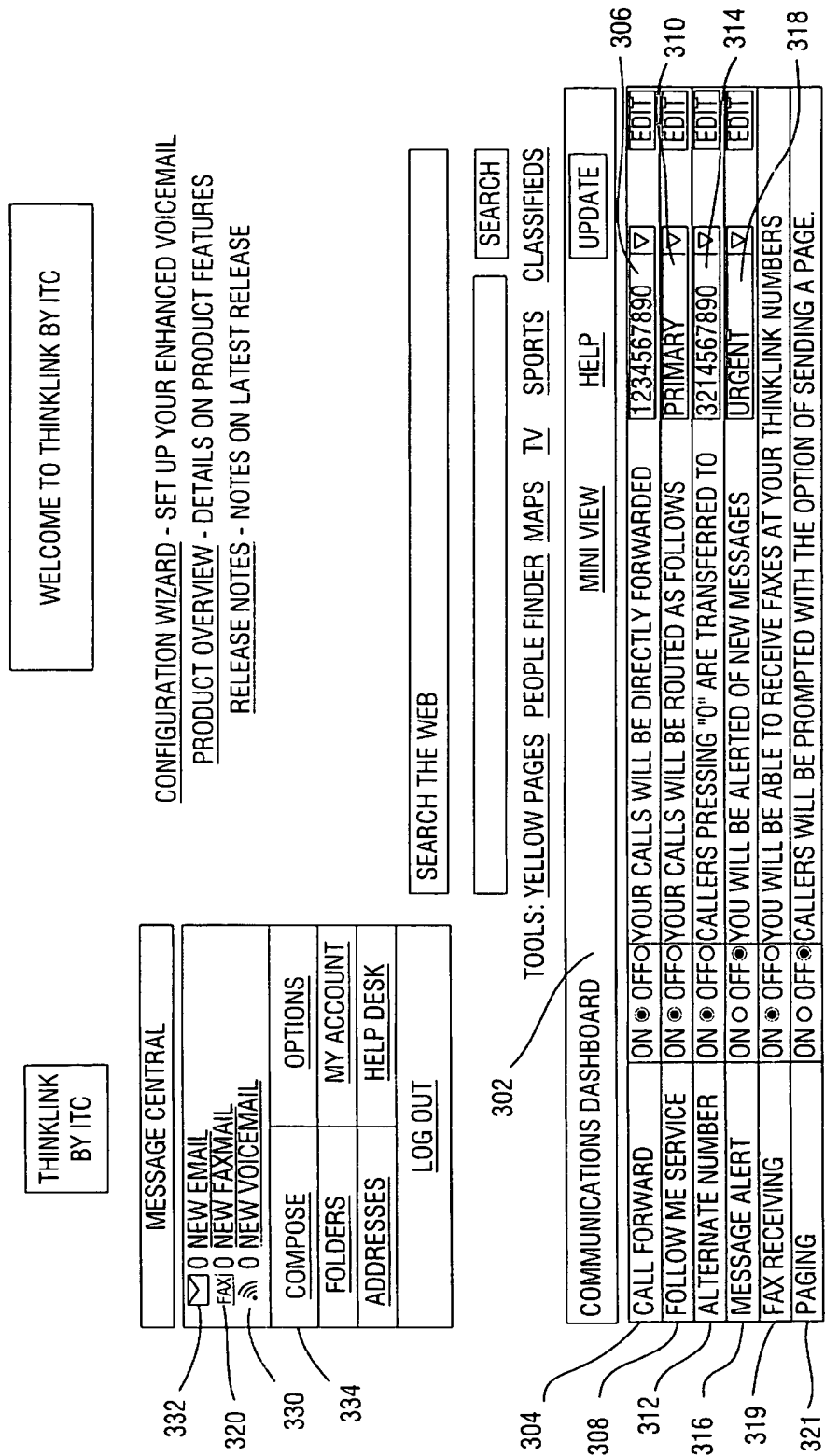
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(57) **ABSTRACT**

A computer-implemented method for permitting a subscriber of a call forwarding service to customize call forwarding parameters associated with the call forwarding service. The call forwarding service being configured to permit the subscriber to specify whether a call received at a telephone number associated with a given account of the call forwarding service be forwarded to a forwarding telephone number. The call forwarding parameters includes a call forwarding enable option and the forwarding telephone number. The method includes providing a subscriber communication profile database. The subscriber communication profile database has therein the account pertaining to the subscriber. The account includes the call forwarding parameters for the subscriber. The method further includes visually displaying the call forwarding parameters on a display terminal coupled to a data-centric network, using a computer server coupled to exchange data with the subscriber communication profile database, when the subscriber employs the display terminal to access the account. There is also included receiving from the subscriber via the display terminal a first change to the call forwarding parameters. The first change to the call forwarding parameters pertains to at least one of the call forwarding enable option and the forwarding telephone number. Further, there is included updating the first change to the account in the subscriber communication profile database, wherein subsequent calls to the given account are handled in accordance with parameters present in the subscriber communication profile database after the update.

35 Claims, 7 Drawing Sheets

FIG. 1

FIG. 2

MAIN MESSAGE SERVER	OUTGOING FAX SERVERS	OUTGOING PAGER SERVERS	OUTGOING VOICEMAIL SERVERS	
202	204	206	208	

32 INCOMING LINES

13 OUTGOING LINES

1 OUTGOING LINE

1 OUTGOING LINE

1 OUTGOING LINE

01. PAGE ME FROM THE WEB

| SUBSCRIBERS OR NON-SUBSCRIBERS | OUTGOING CALLS | FAX NUMBERS | PAGER COMPANIES | VOICEMAIL/ PHONE #S |

FIG. 3

THINKLINK
BY ITC

MESSAGE CENTRAL

☑ 0 NEW EMAIL — 332
FAX 0 NEW FAXMAIL — 320
📶 0 NEW VOICEMAIL

COMPOSE	OPTIONS
FOLDERS	MY ACCOUNT
ADDRESSES	HELP DESK

330
334

LOG OUT

WELCOME TO THINKLINK BY ITC

CONFIGURATION WIZARD - SET UP YOUR ENHANCED VOICEMAIL
PRODUCT OVERVIEW - DETAILS ON PRODUCT FEATURES
RELEASE NOTES - NOTES ON LATEST RELEASE

SEARCH THE WEB

SEARCH

TOOLS: YELLOW PAGES PEOPLE FINDER MAPS TV SPORTS CLASSIFIEDS

302

COMMUNICATIONS DASHBOARD		MINI VIEW	HELP	UPDATE

304

CALL FORWARD	ON ◉ OFF ○	YOUR CALLS WILL BE DIRECTLY FORWARDED	1234567890 ▽	EDIT	— 306
FOLLOW ME SERVICE	ON ◉ OFF ○	YOUR CALLS WILL BE ROUTED AS FOLLOWS	PRIMARY ▽	EDIT	— 310
ALTERNATE NUMBER	ON ◉ OFF ○	CALLERS PRESSING "0" ARE TRANSFERRED TO	3214567890 ▽	EDIT	— 314
MESSAGE ALERT	ON ○ OFF ◉	YOU WILL BE ALERTED OF NEW MESSAGES	URGENT ▽	EDIT	— 318
FAX RECEIVING	ON ◉ OFF ○	YOU WILL BE ABLE TO RECEIVE FAXES AT YOUR THINKLINK NUMBERS			
PAGING	ON ○ OFF ◉	CALLERS WILL BE PROMPTED WITH THE OPTION OF SENDING A PAGE.			

308
312
316
319
321

FIG. 4

HOME
COMPOSE
FOLDERS
ADDRESSES
OPTIONS
MY ACCOUNTS
HELP DESK
LOG OUT

OPTIONS		SAVE AND CLOSE	HELP

ADVANCED COMMUNICATION SETTINGS

CALL FORWARD   SECONDARY ON ⦿ OFF ○   ON ⦿ OFF ○

FORWARD CALL TO [(123)456-7890] (H) (CELL) [   ]
(W) (1) (2)

FOLLOW ME   ON ⦿ OFF ○

FOLLOW ME CALL ROUTING [PRIMARY ▽]

PRIMARY   SECONDARY
1. [(123)456-7890]   1. [(123)456-7890]
2. [(123)789-4560]   2. [(123)456-7890]
3. [(321)456-7890]   3. [(321)456-7890]

OVERRIDE [   ]   ON ⦿ OFF ○

ALTERNATE NUMBER

"0" FORWARDS TO [(321)456-7890] (H) (CELL)
(W) (1) (2)

PAGING   ON ○ OFF ⦿

NUMBER [   ] PIN [   ]
(NOTE: YOU MUST ENTER PIN IF REQUIRED BY YOUR PAGER SERVICE)
[PERSONAL NUMBERS] (NOTE: WHEN BOTH CALL FORWARD AND FOLLOW ME ARE TURNED ON THE CALLER IS
FORWARDED FIRST. IF THERE IS NO ANSWER AT THE FORWARD NUMBER, THE CALLER IS
GIVEN THE OPTION TO USE THE FOLLOW ME FEATURE.)

FAX RECEIVING

☐ FORWARD FAXES TO [   ]
(HOME FAX) (WORK FAX)

FAX SENDING   SEND ATTEMPTS [1 ▽]

INTERVAL BETWEEN [5 ▽]
ATTEMPTS (MIN)

MESSAGE ALERT

YOU WILL BE PAGED FOR:

[URGENT MESSAGES ▽]

INCLUDES: -NEW VOICEMAIL
              -NEW FAXES
              -NEW EMAIL
              (IN THE FOLDERS SELECTED AT RIGHT)

☐ INBOX

304 308 306 402 312 321 314 310 404A 404B 406 319 408 316 318

FIG. 5

START

SUBSCRIBER'S ASSIGNED PHONE NUMBER IS DIALED   502

TELEPHONY SERVER OBTAINS DNIS   504

506   TELEPHONY SERVER LOOKS UP COMMUNICATION OPTION SETTINGS IN DATABASE SERVER

512   ROUTE CALL ACCORDINGLY

508   DIALOGIC BOARD LISTENS FOR FAX OR KEY DIGIT   NO   HANDLE CALL IN ACCORDANCE WITH COMMUNICATION OPTION SETTINGS   510

KEYED DIGIT YES

YES FAX

HANDLE KEYED DIGITS IN ACCORDANCE WITH COMMUNICATION OPTION SETTINGS   516

HANDLE FAX IN ACCORDANCE WITH COMMUNICATION OPTION SETTINGS   514

FIG. 6

START

SUBSCRIBER
ACCESSES UNIFIED
MESSAGING
SYSTEM WEB SITE — 602

WEB SERVER SERVES
UP LOGIN PAGE — 604

SUBSCRIBER ID IS
ENTERED AT THE
LOGIN PAGE — 606

WEB SERVER COMPARES
SUBSCRIBER ID WITH
SUBSCRIBER ACCOUNT
AUTHENTICATION DATA IN
THE DATABASE SERVER — 608

ASSUMING
AUTHENTICATION IS
OK

GRAPHICAL MENU OF
COMMUNICATION OPTIONS
IS SERVED UP TO THE
SUBSCRIBER — 610

SUBSCRIBER MODIFIES
COMMUNICATION
OPTION SETTINGS — 612

614 — SUBSCRIBER SAVES
THE MODIFIED
COMMUNICATION
OPTION SETTINGS

FIG. 7

START
HANDLE CALL IN
ACCORDANCE WITH
COMMUNICATION
OPTION SETTINGS
(STEP 510, FIG. 5)

702

IS CALL
FORWARDING
OPTION
ENABLED?

NO →

704

ARE
OTHER
COMMUNICATION
OPTIONS
ENABLED?

YES →

HANDLE CALL IN
ACCORDANCE WITH
OTHER COMMUNICATION
OPTIONS

716

718

ROUTE CALL
ACCORDINGLY

YES

706

TELEPHONY SERVER
INITIATES OUTGOING
CALL TO FORWARDED
NUMBER

714

TELEPHONY SERVER
INFORMS CALLER OF
FAILURE

NO

708

IS
OUTGOING CALL
SUCCESSFULLY
CONNECTED?

NO →

CALLER SENT TO
VOICE MAIL

720

YES

TELEPHONY SERVER
CONNECTS THE
INCOMING CALL WITH
THE SUCCESSFUL
OUTGOING CALL TO
COMPLETE END-TO-END
CONNECTION

710

712

CALL
FORWARDED

COMPUTER-IMPLEMENTED CALL FORWARDING OPTIONS AND METHODS THEREFOR IN A UNIFIED MESSAGING SYSTEM

RELATED APPLICATIONS

The following commonly-owned, co-pending patent applications are related and are incorporated herein by reference.

app. Ser. No. 09/239,560, filed Jan. 29, 1999, entitled "INTEGRATED MESSAGE STORAGE AND RETRIEVAL SYSTEM DISTRIBUTED OVER A LARGE GEOGRAPHICAL AREA";

app. Ser. No. 09/240,367, filed Jan. 29, 1999, entitled "A SYSTEM AND METHOD FOR PROVIDING UNIFIED MESSAGING TO A USER WITH A THIN WEB BROWSER";

U.S. Pat. No. 6,263,064, issued Jul. 17, 2001, entitled "CENTRALIZED COMMUNICATION CONTROL CENTER FOR VISUALLY AND AUDIBLY UPDATING COMMUNICATION OPTIONS ASSOCIATED WITH COMMUNICATION SERVICES OF A UNIFIED MESSAGING SYSTEM AND METHODS THEREFOR";

app. Ser. No. 09/240,893, filed Jan. 29, 1999, entitled "INTERACTIVE BILLING SYSTEM UTILIZING A THIN WEB CLIENT INTERFACE";

app. Ser. No. 09/240,368, filed Jan. 29, 1999, entitled "A SYSTEM AND METHOD TO MANAGE PHONE SOURCED MESSAGES";

app. Ser. No. 09/240,434, filed Jan. 29, 1999, entitled "METHOD AND APPARATUS FOR NETWORK INDEPENDENT INITIATION OF TELEPHONY";

app. Ser. No. 09/240,435, filed Jan. 29, 1999, entitled "APPARATUS AND METHOD FOR DEVICE INDEPENDENT MESSAGING NOTIFICATION";

app. Ser. No. 09/240,436, filed Jan. 29, 1999, entitled "APPARATUS AND METHOD FOR CHANNEL-TRANSPARENT MULTIMEDIA BROADCAST MESSAGING";

app. Ser. No. 09/239,589, filed Jan. 29, 1999, entitled "VOICE ACCESS THROUGH A DATA-CENTRIC NETWORK TO AN INTEGRATED MESSAGE STORAGE AND RETRIEVAL SYSTEM".

BACKGROUND OF THE INVENTION

The present invention relates to communication services available via a data-centric network (i.e., a network that carries digital data) and a telephony-centric network (i.e., a network that carries telephony information such as voice, fax, pager, and the like). More particularly, the present invention relates to a centralized facility and methods therefor that allow a subscriber of various communication services to review and customize his communication options, in an interactive and simplified manner, via either the data-centric network or the telephony-centric network.

Both the data-centric network (e.g., a distributed computer network) and the telephony-centric network (e.g., public telephone network) have existed for some time. Broadly speaking, the data-centric network (such as the Internet) may be thought of as a global computer network that connects millions of computer terminals all over the world in such a way that digitized information can be exchanged irrespective of the different hardware and software platforms that may be utilized to gain access to the data-centric network. People and businesses around the

world use the data-centric network to retrieve information, communicate and conduct business globally, and access a vast array of services and resources on-line. In a similar manner, the telephony-centric network (whether wired or wireless) may also be thought of as another global network that connects the millions of telephony devices (such as voice-oriented telephones, pagers, facsimile machines, voice mail boxes, and the like) together in such a way that a user at one of the telephony devices can readily transmit information to other telephony devices irrespective of geographic boundaries.

In the past, these two networks existed as separate domains. This is because the widely accessible data-centric network is a fairly recent phenomenon. For decades, the only network that has been available to the masses is the analog teltphony-centric network, starting with the telegraph network of the nineteenth century. However, as more and more of the services traditionally offered through the telephony-centric network are being offered in a digital format by the data-centric network, the distinction between the data-centric network and the telephony-centric network begins to blur. Irrespective of whether these two networks exist as separate networks physically or conceptually going forward, the legacies of their separate existence can be seen in the various different communication services and communication devices that currently exist.

By way of example, there exist many different communication devices and services available today to allow a person to communicate to another person, e.g., telephones, facsimile machines, electronic mail (e-mail), pagers, voice mail, and the like. Generally speaking, a telephone is a communication device employed to transmit and receive speech and other sounds. A facsimile machine is a communication device to transmit and receive graphical data. A pager is a highly portable device that allows its user to receive data, and in some cases transmit limited data to a pager service provider. A voice mail box is essentially a service that allows one person to temporarily store telephone messages for retrieval by another. E-mail services allow e-mail users to transmit and receive data from computer terminals connected to the data-centric network. All these devices and services are well known in the art and will not be elaborated further for the sake of brevity.

Generally speaking, most of these devices and services have many options associated with how they function. These options allow a user specialized functionality. One particular option is call forwarding. Call forwarding refers to the ability to reroute calls originally destined for one telephone to a different telephone. Call forwarding is desired since nowadays, people are constantly on the move from one location to another. It is not uncommon for people to work at multiple sites such as the home and the office. Even when people are mobile, it is important that they remain in the communication loop. For example, a person who travels may wish to forward voice calls made to his home or office telephone numbers to his cellular telephone or hotel telephone.

To accomplish the above in the current art, the person in the above example would, for example, enter a code (e.g., *72) at the telephone from which the forwarding is done, followed by the forwarded number. When an incoming call is made to the telephone number associated with the telephone from which the forwarding is done, it is routed to the outgoing number entered after the code. To undo the call forwarding, the user typically needs to be at the telephone from which the forwarding was done to enter another code to cancel the call forwarding (e.g., *75). To change the

forwarded number to another forwarded number, the user also typically needs to be at the telephone from which the forwarding is done in order to cancel the forwarding as above, and re-enter the code for call forwarding (e.g., *72), plus enter the new forwarding telephone number.

The requirement that the user be present at the telephone from which forwarding is done in order to initiate, cancel, or change the call forwarding options has its disadvantages. By way of example, the user oftentimes may wish to perform the initiation, cancellation, or changing of the call forwarding option from the road but may be unable to do so due to the geographic distance from the telephone set from which forwarding originates. Furthermore, the user may sometimes not be able to access any telephone at all (due to the lack of a telephony-centric network, for example). In this case, it has not been possible for the user to edit the call forwarding options.

Another disadvantage with current call forwarding is that if the forwarded call may not connect, the call is lost. This is especially unwelcome when the forwarded party has an answering machine or voicemail set-up and the forwarding party does not.

Another disadvantage is that the user has to memorize and/or keep track of the codes used for doing call forwarding. A busy user might not bother to learn or memorize all the codes and would rather suffer the possibility of missing out on some messages than keep track of the codes and current forwarded numbers. In this case, the communication services that he owns are not employed to their fullest potential.

Also, another disadvantage is that the user cannot set non-fax call forwarding on without also turning fax-forwarding on. This is because current call forwarding schemes do not distinguish between a fax call and any other calls (e.g., voice calls) for the purpose of forwarding. This is particularly problematic when the forwarding number has no fax receiving capability while the forwarded number has.

Yet another disadvantage is that every time the number code is used, the telephone company (telco) charges the user. For example, if the user selects *72 five times in one day, the telephone company will charge the user five times.

In view of the forgoing there are desired improved techniques for allowing a user of communication services to review and customize the call forwarding options associated with these services in a simplified, convenient and cost effective manner.

SUMMARY OF THE INVENTION

The invention relates, in one embodiment, to a computer-implemented control center for permitting a subscriber of a unified messaging system to customize call forwarding parameters associated with a call forwarding service. The call forwarding service is configured to permit the subscriber to specify whether a call received at a telephone number associated with a given account of the unified messaging system be forwarded to a forwarding telephone number. The call forwarding parameters includes a call forwarding enable option and the forwarding telephone number. The computer-implemented control center includes a subscriber communication profile database. The subscriber communication profile database has therein the account pertaining to the subscriber. The account includes the call forwarding parameters for the subscriber. The computer-implemented control center includes a computer server coupled to exchange data with the subscriber communication profile database. The computer server is configured to visually display the call

forwarding parameters on a display terminal coupled to a data-centric network when the subscriber employs the display terminal to access the computer-implemented control center. The computer server also is configured to receive from the subscriber via the display terminal a first change to the call forwarding parameters and to update the first change to the account in the subscriber communication profile database, wherein subsequent calls to the given account are handled in accordance with parameters present in the subscriber communication profile database after the update.

The invention relates, in another embodiment, to a computer-implemented method for permitting a subscriber of a call forwarding service to customize call forwarding parameters associated with the call forwarding service. The call forwarding service being configured to permit the subscriber to specify whether a call received at a telephone number associated with a given account of the call forwarding service be forwarded to a forwarding telephone number. The call forwarding parameters includes a call forwarding enable option and the forwarding telephone number. The method includes providing a subscriber communication profile database. The subscriber communication profile database has therein the account pertaining to the subscriber. The account includes the call forwarding parameters for the subscriber. The method further includes visually displaying the call forwarding parameters on a display terminal coupled to a data-centric network, using a computer server coupled to exchange data with the subscriber communication profile database, when the subscriber employs the display terminal to access the account. There is also included receiving from the subscriber via the display terminal a first change to the call forwarding parameters. The first change to the call forwarding parameters pertains to at least one of the call forwarding enable option and the forwarding telephone number. Further, there is included updating the first change to the account in the subscriber communication profile database, wherein subsequent calls to the given account are handled in accordance with parameters present in the subscriber communication profile database after the update.

These and other features of the present invention will be described in more detail below in the detailed description of the invention and in conjunction with the following figures.

BRIEF DESCRIPTION OF THE DRAWING

The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

FIG. 1 depicts, in one embodiment, the general overview of the unified message system.

FIG. 2 illustrates, in one embodiment, how the 48 telephone lines provided per T1 link may be divided among the sub-servers of the telephony server.

FIG. 3, in one embodiment, the user interface portion of the computer-implemented control center, representing the visual display panel for displaying the communication options pertaining to a particular subscriber on a computer display screen.

FIG. 4 shows the communication options in greater detail, in accordance with one embodiment of the present invention.

FIG. 5 is a flow diagram depicting, in one embodiment, the relevant steps of a computer-implemented process for handling access to the unified messaging system through the telephony-centric network by a subscribing or a non-subscribing caller.

5

6

FIG. 6 is a flow diagram depicting, in one embodiment, the relevant steps of a computer implemented process for handling access to the unified messaging system through a computer network by a subscriber.

FIG. 7 is a flow diagram depicting, in one embodiment, the relevant steps of a computer-implemented process for handling the routing of call forwarding in a unified messaging system.

DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention will now be described in detail with reference to a few preferred embodiments thereof and as illustrated in the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be obvious, however, to one skilled in the art, that the present invention may be practiced without some or all of these specific details. In other instances, well known process steps have not been described in detail in order not to unnecessarily obscure the present invention.

In accordance with one aspect of the present invention, there is provided a computer-implemented control center which is coupled to the data-centric network and the telephony-centric network, and which allows a user to access, using either a telephone or a computer, the communication options associated with the various communication services of a unified messaging service. Unlike the prior art approach which requires the user to contact individual service providers/accounts and/or to access individual communication devices to review and change the communication options associated therewith, the computer-implemented control center allows the communication options associated with the various communication services to be accessed substantially all at once. That is, the computer-implemented control center provides a single central facility through which the communication option settings associated with the different communication services may be reviewed and/or modified.

In accordance with one aspect of the present invention, the communication options, which include the options associated with individual communication services as well as routings among the different individual communication services, are accessible using either a computer network interface (e.g., a web page) or a telephone network interface (e.g., via a telephone). The communication option settings themselves do not reside with individual communication devices or require access through a particular communication device (such as with the assigned facsimile machines or telephones discussed earlier). Rather, the communication option settings are centralized within the universally accessible computer-implemented control center and can be utilized to properly control the communication options associated with the various services and to facilitate control of the routings therebetween. More importantly, they can be reviewed and modified by a properly authenticated subscriber of the unified messaging service through any suitable computer or telephone irrespective of the geographic location from which the accessing and/or modifications are made.

In accordance with yet another aspect of the present invention, the communication options which are reviewable and editable through any suitable computer or telephone include a call forwarding option. The call forwarding option enables a user to reroute calls from one telephone to another. A user is able to review or modify features of call forward-

ing. By way of example, a user is able to check whether it is enabled, verify the forwarding number, select a number from a preprogrammed list, add a new number to a preprogrammed list, or enter a temporary number. As mentioned, this option can be reviewed or modified by a properly authenticated subscriber of the unified messaging service through any suitable computer or telephone irrespective of the geographic location from which the accessing and/or modifications are made.

In the aforementioned co-pending patent applications entitled "INTEGRATED MESSAGE STORAGE AND RETRIEVAL SYSTEM DISTRIBUTED OVER A LARGE GEOGRAPHICAL AREA" (app. Ser. No. 09/239,560, filed Jan. 29, 1999), and "A SYSTEM AND METHOD FOR PROVIDING UNIFIED MESSAGING TO A USER WITH A THIN WEB BROWSER (app. Ser. No. 09/240,367, filed Jan. 29, 1999), which are all incorporated herein by reference, some inventive unified messaging services and their various features are disclosed. Although the present invention may be implemented on any unified messaging system, reference may be made to the above-mentioned co-pending patent applications for details pertaining to preferable unified messaging systems on which the present invention may be implemented.

In general terms, a unified messaging system benefits a user by integrating various communication services, which up to now have existed as separate services. The integration facilitates simplified management, billing, and more importantly the routing of messages among the various services. With a unified messaging service, a user may, for example, specify that an incoming facsimile be forwarded to a computer for viewing or to a printer for printing, listen to e-mail messages through a telephone, receive pager notification when a facsimile is received, or the like. Within limits, a unified messaging system allows messages to be received, stored, retrieved, and/or forwarded (in the original format or in a different/abbreviated format) without regard to the communication devices and/or networks (i.e., data-centric vs. telephony-centric) employed for the transmission of the messages.

A unified messaging system implemented on a data-centric network takes the unified messaging system concept a step further by internally storing and manipulating the messages in a digital format irrespective of whether the message was received and/or will be sent in the digital or analog format. As is well known, digital formatting increases the flexibility with which information contained in the messages can be analyzed, stored, manipulated, and/or routed among the various communication devices. More importantly, the implementation of the unified messaging system on a data-centric network permits the subscriber to access his account through any computer or telephone irrespective of the geographic location from which the accessing and/or modifications are made.

To facilitate discussion, FIG. 1 depicts, in accordance with one embodiment of the present invention, the general overview of a unified message system 101. With reference to FIG. 1, there is shown a user computer 100, representing a computer that may be employed to access and/or modify the communication options associated with the communication services offered by the unified messaging system. Although user computer 100 is shown to be a desktop personal computer (such as an Intel-based personal computer), user computer 100 may in fact represent any computing device capable of accessing the data-centric network (represented by reference 102 in FIG. 1). By way of example, user computer 100 may represent a laptop

computer, which may access the data-centric network either through wired connections or in a wireless manner. As another example, user computer 100 may represent a personal digital assistant (PDA) or a palm-top computer, or a thin-client type computer.

Data-centric network 102 may represent any computer network which couples together users from geographically dispersed locations. In a preferred embodiment, data-centric network 102 represents the Internet, although data-centric network 102 may also represent a Wide Area Network (WAN), a Local Area Network (LAN), a Virtual Private Network (VPN) or any similarly suitable networking arrangement that allows users to log in from a remote terminal.

With reference to FIG. 1, there is shown data link 104, representing the high speed data lines for transmitting and receiving data between unified messaging system 101 and data-centric network 102. In a preferred embodiment, data link 104 is implemented by high speed T1 data lines, although other types of data lines such as fiber optics may also be employed. A network interface system 105 couples data link 104 to the remainder of unified messaging system 101, which is shown to include four servers as shown (the servers are discussed later herein).

Network interface system 105 represents the interface system that ensures data is properly transmitted and received between unified messaging system 101 and data-centric network 102. Of course network interface system 105 may vary depending on the implementations of the data-centric network and/or the portion of unified messaging system 101 to which network interface system 105 is coupled.

In the case of the Internet, one current preferred implementation of network interface system 105 may include a router 106, a hub 108, a DNS (Domain Name System) facility 110, and a firewall 112. Typically, the router 106 is a piece of hardware or software that examines the IP address of data packets and determines the routing of the data packets based on the IP address.

Router 106 acts cooperatively with hub 108 and DNS facility 110 to permit properly addressed data packets to be received through firewall 112. Router 106, hub 108, DNS facility 110, and firewall 112 are conventional and will not be belabored here for the sake of brevity.

At the heart of the unified message system are a set of servers which are coupled to exchange data and are connected to firewall 112 and the public telephone network. Typically, a server represents a computer that processes data for use by other data-consumer devices (such as other servers, computers or any of the communication devices through a proper interface circuit). There is shown a database server 120, which is employed to, among other tasks, organize and maintain the subscriber communication profile database. The subscriber communication profile database itself may reside with database server 120 and represents a data store of subscriber accounts and communication option settings associated therewith. Incoming messages to a particular subscriber or outgoing messages from that subscriber are formatted and routed in accordance with the communication option settings stored in the subscriber communication profile database. Properly authorized changes to the communication option settings will be reflected in the communication option settings stored in the subscriber communication profile database and employed to handle subsequent messages (whether incoming or outgoing).

Subscriber authentication data may be employed to access to a subscriber communication profile database. Subscriber

authentication data may be stored in the database server. Subscriber authentication may be accomplished using several techniques. For example, a numeric password, an alphanumeric password, a hidden code wherein the password is randomly hidden in a string (i.e., xxxppppxx, xppppxxxx, etc.) and biometrics (e.g., retina scans, hand prints, palm prints, finger prints, voice recognition, etc.).

A web server 122 is employed to facilitate interaction between unified messaging system 101 and data-centric network 102. Web server 122 represents one of the system-side servers (i.e., a server that handles the exchange of data with the user's computer via the data-centric network) and is employed, for example, to present to user computer 100 the log-in screen when a subscriber employs user computer 100 to access the unified messaging service. Once that subscriber is properly authenticated (e.g., through a password procedure or another suitable authentication procedure), web server 122 then communicates with database server 120 to obtain the current communication option settings for that subscriber and to display the current communication option settings and an individualized web page to the subscriber for review.

In one preferred embodiment, web server 122 is employed to store all messages pertaining to a particular subscriber. The messages are stored as files in web server 122. These messages may represent, for example, voice files, facsimiles, e-mail messages, voice mail messages, or the like. Pointers in database server 120 facilitate access to the stored messages in web server 122. However, it is contemplated that the messages may be stored in any of the servers discussed herein and/or in a separate storage device accessible by the servers.

An e-mail server 124 is employed to process incoming and outgoing e-mail messages. By way of example, e-mail server 124 may be employed to format/translate the e-mail messages so that they can be properly transmitted to other e-mail systems and understood thereat. For incoming messages, e-mail server 124 may be employed to format/translate the information transmitted via the incoming e-mail and to prepare them for use by other data consumers.

A telephony server 126 is shown coupled between telephone link 128 and the remainder of the unified messaging system and may include any number of sub-servers, such as are shown in FIG. 2. In a manner analogous to web server 122, telephony server 126 represents a system-side server (i.e., a telephony server that handles the exchange of information with the user via the telephony-centric network) and is employed to facilitate interaction between unified messaging system 101 and telephony-centric network 129. Telephony server 126 may be employed to, for example, translate the telephone signals (such as the dialed digits) into a digital format for the purpose of authenticating and allowing subscriber access. Telephony server 126 may also be employed to translate such dialed digits and/or other telephone signals (such as a facsimile tones or verbal commands) into digital data, which may then be employed to facilitate handling of messages and/or the communication option settings. In one embodiment, Dialogic board models D 240 SC-T1, D 480 SC-1, CP-4/SC, CP-6/SC, and/or CP-12/SC (available from Dialogic Corporation of Parsippany, N.J.) are employed to facilitate the translation between telephone signals and digital data. Once translation is performed, software within telephony server 126 employs the digital data to decide how to handle the message using the communication option settings obtained from the subscriber communication profile database. If the subscriber, through predefined dialing sequences, indicates that he

wishes to review and/or modify the communication option settings, software within telephony server **126** operates cooperatively with database server **120** to affect the change to the communication option settings. Once the communication option settings are reflected in the subscriber communication profile database stored in database server **120**, the new communication option settings are consulted each time a message needs to be handled by the unified messaging system.

Telephony-centric network **129** represents any telephone network which couples together telephony-type communication devices (e.g., facsimile machines, pagers, telephones) from geographically dispersed locations. By way of example, telephony-centric network **129** may represent a plain old telephone system (POTS), a wired telephone network popularly known as Public Service Telephone Network (PSTN) or a cellular network or a combination thereof. Telephony-centric network **129** is well known and will not be discussed in great detail here for the sake of brevity.

A telephone **130** is shown coupled to telephony-centric network **129**. In reality, it should be understood that a wide variety of telephony devices (which are not shown to simplify the illustration) are connected to telephony-centric network **129**. Some of these exemplary communication devices are, as mentioned, facsimile machines, pagers, cellular telephone sets, wired telephone sets, and the like.

Telephone link **128** represents the telephone communication channels for transmitting and receiving telephone signals between unified messaging system **101** and telephony-centric network **129**. In a preferred embodiment, telephone link **128** represents high bandwidth T1 telephone links, although other types of telephone links may also be employed. Note that there is no requirement that the data transmitted on telephone link **128** be analog. In fact, with the upcoming convergence of data networks and telephone networks, the telephony information that traverses telephone link **128** may well be digital (in which case, telephony server **116** will be adapted to handle digital telephony signals instead of analog telephony signals). As a noteworthy point, it is expected that as data networks and telephone networks converge, the relevant functionality represented by the servers herein may still apply, albeit with the proper modification to handle an all-digital combined data/telephone network.

FIG. 2 illustrates, in accordance with one embodiment of the present invention, how the 48 telephone lines provided per T1 link may be divided among the subservers of telephony server **126**. As shown in FIG. 2, 45 of the telephone lines may be employed by a main message server **202** to handle the incoming/outgoing voice calls, the incoming voice mail messages, and the incoming facsimiles. Of the 45 telephone lines, 32 may be provisioned for the subscribing or non-subscribing users to dial into the unified messaging system, and the other 13 telephone lines may be employed to allow outgoing calls to be made from within the unified messaging system. The outgoing calls may, for example, be calls destined for the unified messaging system but are rerouted out of the unified messaging system in accordance with a subscriber's communication option setting or they may be originated by the subscriber, who dials into the unified messaging system (using a toll-free access number, for example) and requests an outgoing call be made therefrom to some destination number (for example by punching in the "#" key after authentication, followed by the destination number), thus employing the unified messaging system as a type of calling card service.

One of the 48 telephone lines of the T1 link may be reserved for outgoing facsimile transmission, which is handled by an outgoing facsimile server **204**. Another telephone line may be apportioned for the outgoing paging service, which is handled by an outgoing pager server **206**. Outgoing voice-mail messages are handled by voice mail server **208**, which is coupled to another one of the 48 telephone lines of the T1 link as shown.

To elaborate, outgoing voicemails are voice messages sent to a voicemail phone number which may be created via the web or the telephone. Outgoing voicemails may be new voicemails, replies to other messages or forwarded as a voicemail. For example, when forwarding a voicemail via the web, the voicemail may be treated as an attachment to a speech synthesized text message with the recipient address as a telephone number. Outgoing voicemail servers may be geographically distributed and communicate with each other via internet in such a way that the server nearest the destination voicemail phone number may be assigned to send the voicemail via either a circuit-switched call or packet-switched call.

Outgoing facsimiles are facsimile messages sent to a facsimile telephone number which may be created via the web or the telephone. Outgoing facsimiles may be new facsimiles, replies to other messages, forwarded as a facsimile or call-forwarded as a facsimile in which the system stores the incoming facsimile and then forwards the facsimile to the subscriber's facsimile-forward number. For example, when forwarding a facsimile via the web, the facsimile may be treated as an attachment to Tiff conversion of a text message with the recipient address as a phone number. Like outgoing voicemail servers, outgoing facsimile servers may also be geographically distributed. Outgoing facsimile servers may communicate with each other via internet in such a way that the server nearest to the destination facsimile telephone number may be assigned to send the facsimile via either a circuit-switched call or packet-switched call.

Outgoing pages are paging messages sent to a pager number which may be created via the telephone either by the caller or by the system when sending notification. Like outgoing voicemail servers, outgoing page servers may also be geographically distributed. Outgoing page servers may communicate with each other via the internet in such a way that the server nearest to the destination pager telephone number may be assigned to send the page via either a circuit-switched call or packet-switched call.

There may also be outgoing emails and their servers that do not involve circuit switched calls. Some pagers may be alphanumerical type and can receive messages as an email. In this case, the outgoing pager server may delegate these requests to the outgoing email servers.

In one embodiment, messages sent to the unified messaging system may be stored in web server **122** with pointers to these messages being held in database server **120**. The above mentioned set of sub-servers (outgoing facsimile server, outgoing pager server and outgoing voice mail server) are arranged to make requests to the database server for outgoing messages stored on the web server. If an outgoing message is detected by a sub-server, software within the sub-servers decides how to handle the outgoing message according to the communication option settings obtained from the subscriber communication profile database. Again, a Dialogic board may be employed, in one embodiment, to facilitate the translation between the stored data and the outgoing telephone signal.

All types of outgoing message requests (voicemail, facsimile, email, pages) are queued in the database server.

These requests can also be associated with a delivery time (e.g., the default time is "now"). Each type of request may be stored in a separate queue. An outgoing server of a particular type of message periodically checks its queue from the database server to see if any request's time is up for delivery.

It should be noted that FIG. 2 shows only one exemplary way to divide the T1 telephone lines among the various sub-servers of telephony server 126. Depending on the traffic pattern generated by subscribing and non-subscribing users of the unified messaging system, these lines and sub-servers may be scaled as necessary.

FIG. 3 illustrates, in accordance with one embodiment of the present invention, the user-interface for an exemplary computer-implemented control center, representing the visual display panel for displaying the communication options pertaining to a particular subscriber on a computer display screen. Through computer-implemented control center 302, the user may quickly and conveniently review the communication option settings associated with the various services and make changes thereto. That is, the computer-implemented control center 302 serves as the centralized control panel for reviewing and/or customizing the communication options associated with the various communication services. FIG. 4 illustrates aspects of computer-implemented control center 302 in greater detail.

In the exemplary implementation of FIG. 3, six representative communication options are shown. The call forwarding service 304, if it is enabled, allows incoming calls through telephony-centric network 129 to be routed to a provided forwarding number 306. The call forwarding option setting may also be seen in the detailed computer-implemented control center view of FIG. 4, which shows the communication options in greater detail.

Forwarding number 306 can be a newly input number or one chosen from a drop down menu. The drop down menu numbers may be preprogrammed or added by a subscriber at any time. The preprogrammed numbers are stored along with all the other communication options in the databas

To accomplish the forwarding, telephony server 126 consults, after a call is made to a subscriber's telephone number, the subscriber communication profile database in database server 120. If the call forwarding option is enabled, that call is then forwarded to the forwarding number specified by telephony server 126 via an outgoing telephone line. If the forwarding number does not pick up, the call may be rerouted, for example, to the subscriber's voice mail box. If the call forwarding option is not enabled and the caller does not choose other methods discussed below to try to contact the subscriber, the call may then be forwarded to the subscriber's voice mail box as well.

The "follow me" service 308 gives the subscriber the ability to designate a set of telephone numbers where he may likely be found and gives the caller the option to try to find the subscriber (or someone who may appropriately handle the incoming call) at those numbers. By way of example, during a work day, a given subscriber may be contacted either at his main office telephone, his secondary office telephone, or his cellular telephone in his car. On the weekend, that same subscriber may be found at home or at a cellular telephone in his boat. The office/car set of telephone numbers may be designated a primary set 310 and the home/boat set of telephone numbers may be designated a second set. FIG. 4 shows the communication options associated with the follow me service in greater detail.

On a week day, the subscriber may enable the follow me service option and select primary set 310 as the set of telephone numbers where he may likely be found. On the weekend, the subscriber may enable the follow me service option and select the secondary set, for example. From the caller's perspective, the follow me service is preferably an on-demand service. That is, the caller is preferably given the option to decide whether to employ the follow me service by pressing a predefined key in response to instructions or to simply allow the call to be passed to voice mail if unanswered.

If the follow me service is enabled by the subscriber and chosen by the caller, telephony server 126 will try to place outgoing calls to the numbers designated in the selected set starting with the first number in the set. To ensure that the call is not inadvertently completed vis-a-vis by a bystander who happens to be near the destination telephone and picks up the telephone when it rings, telephony server 126 may allow the caller to record his name. Telephony server 126 then announces the name to the person picking up the destination telephone prior to giving that person a choice of whether to accept the call. If the person who picks up the call is indeed the person for whom the call is intended, the entry of a predefined key press (on instructions by telephony server 126) on the destination telephone keypad will allow telephony server 126 to complete the end-to-end connection. In this manner, the follow me service may be employed as a call screening mechanism if desired. Telephony server 126 may try all the numbers in the set in sequence until the subscriber is found. If not, the call may be allowed to pass into the subscriber's voice mail box.

In one embodiment, the follow-me service may not always use the same sequence to callout a subscriber when the subscriber has set up several numbers as his possible locations (e.g., weekday routine or weekend and evening routine). The follow-me service may use the number where the subscriber is last located (stored in memory) as the first number to dial in the sequence provided the time for the last location happened within a certain interval (e.g., an hour).

An alternate number service 312 gives the subscriber the ability to designate a telephone number as an alternate number where the caller can attempt to locate the subscriber (or someone who may appropriately handle the incoming call) at a number designated in advance (314). FIG. 4 shows the communication options associated with the alternate number service in greater detail. The alternate number option is similar to call forwarding with the exception that the alternate number option is an on-demand service. That is, the caller is preferably given the option to decide whether to employ the alternate number service by pressing a predefined key in response to instructions or to simply allow the call to be passed to voice-mail if unanswered. In all other respects, the alternate number service may function in the same way as the call forwarding service. An alternate number may also be used to set a personal operator number (e.g., your secretary).

A message alert option 316 gives the subscriber the ability to select whether to be alerted when a message is received. The message that triggers the alert may be specified using any number of filtering criteria stored as part of the subscriber communication option settings. In the example of FIG. 3, the filtering criteria is "urgent" (318) although any type of filtering may be applied. For example, the filtering criteria could be the message's sender, subject or content. The sender could be identified by his email address or phone number (e.g., caller ID).

FIG. 4 shows, in one embodiment, the communication option settings associated with the unified messaging service

in greater detail. With respect to the message alert service, the alerting itself may be accomplished using any of the communication devices controlled by the unified messaging system (e.g., pager, telephone at a designated number, voice mail in a designated voice mail box, facsimile at a designated facsimile number, e-mail at a designated e-mail address, and the like). In accordance with one particularly advantageous embodiment, the message alert is sent to a pager via outgoing pager sub-server 206 since it is the device most likely to be near the subscriber. In one embodiment, the server that sends the alert (e.g., the web server if the incoming message is an e-mail, the telephony server if the incoming message is a facsimile or telephone call) may send out a predefined alphanumeric code that identifies the type of incoming message. The alphanumeric code itself may be predefined either by the unified messaging system or by the subscriber if customization is desired. Preferably, the alert is sent to the subscriber's own number to alert the subscriber that an incoming message fitting the filtering criteria has been received at the unified messaging system.

A facsimile receiving service 319 allows the user to receive facsimile at the unified messaging system if someone sends a facsimile to the subscriber's telephone number. FIG. 4 shows the communication options associated with the facsimile receiving service in greater detail. If the facsimile receiving option is enabled, telephony server 126 will monitor for the facsimile tone and process the incoming message as a facsimile if the facsimile tone is detected. In one embodiment, the incoming facsimile is stored as a GIF or TIFF file that may be viewed by the subscriber through a web page by clicking on facsimile mail link 320. If the facsimile forward option 406 is also enabled, the facsimile will also be forwarded by the outgoing facsimile server 204 to another facsimile machine at specified facsimile number 408, additionally or alternatively to storing a copy of the received facsimile at the unified messaging service. If the facsimile option is not enabled but the call forwarding option is enabled, the call is forwarded on and may be picked up by the forwarded device (if it is a functioning facsimile machine). If not, the incoming facsimile will not be received.

A paging service 321 allows a message sent to the subscriber to be rerouted to a pager designated by the subscriber. Paging service 321 is preferably an on-demand service and allows the caller, if desired, to send a short message to a pager designated by the subscriber. The pager number designated by the subscriber may be designated at location 404a (the paging service number) and, if required, using location 404b (the PIN number for the pager). If the paging service is enabled, a caller to the subscriber's telephone number will be given an option to send a short message to the pager subscriber pager (for example, by pressing a predefined key to send the short message). As noted before, the caller may also choose any of the other services follow me service 308 and/or alternate number 312 if enabled. In this manner, a single telephone number may serve as the access point to receive a page, a voice message, a facsimile, etc.

For alphanumeric pagers with an email address, the outgoing page server may use text to describe the alert message (e.g., "you have a urgent voicemail from caller ID 4152222222 with return number 4153333333") instead of codes as in the case of numeric pagers. The outgoing pager server can then delegate the alert messages to the outgoing email server.

In one embodiment, the telephony server distinguishes between a fax call and non-fax call (by, for example,

analyzing the tone). When the call forwarding option is enabled, it enables only non-fax call forward. To enable fax call forwarding, the user needs to enable the fax forwarding option. In case of fax forwarding, the fax is intercepted and received by the telephony server. After the fax is received, a copy is then sent to the forwarding number if it has the fax-receiving capability. In addition to allowing the subscriber to forward fax and non fax calls separately, this approach further allows the user to access the fax from anywhere via telephone or web.

Voice mail messages that are stored may be listened to using either the computer (through an appropriate software/sound card) by clicking on voice mail link 330 (FIG. 3) or a telephone coupled to the telephony-centric network. E-mails that are sent to the subscriber using the subscriber's e-mail address may be read on-line by, for example, clicking on e-mail link 332 (FIG. 3). In one embodiment, telephone server 126 may be equipped with a text-to-speech facility to allow the subscriber to listen to the content of the e-mail message through a telephone. FIG. 3 also shows an outgoing e-mail link 334, which links the subscriber to an e-mail application program to allow the subscriber to compose and send out e-mail messages. In the case of replying an email via phone, a voice recording may be taken and sent as an email attachment.

As can be appreciated from the above examples, computer-implemented control center 302 provides a central visual interface that allows a subscriber to efficiently review and/or modify the communication option settings associated with the various communication services offered. This is in sharp contrast with time-consuming and burdensome prior art approaches whereby the person is required to contact different entities and deal with different accounts to change the communication options associated with different communication services.

In one embodiment, the computer-implemented control center has two views: the minimized view and the full view. In the minimized view (e.g., FIG. 3 in one embodiment), the computer-implemented control center may simply show the simplified routing details and the on-off settings associated with the communication options. Although the user may make changes to the on-off settings, fuller edit capabilities are preferably provided in the full view. In the full view (e.g., FIG. 4 in one embodiment), the computer-implemented control center additionally add explanations and detailed routing choices. If desired, an authentication procedure may be implemented with either the minimized view or the full view to ensure that the person making editing changes to the communication options is properly authorized.

It should be appreciated that the communication services and options discussed in connection with FIGS. 3 and 4 are only illustrative of the capabilities of the inventive computer-implemented control center. It should be apparent to those skilled in the art that the same control panel may be presented to the subscriber through the telephony server and the telephone interface if the subscriber wishes to review and/or change the communication options using a telephone connected to the telephony-centric network. The communication options may be presented in a sound format and the subscriber may be offered an option menu to review and/or change any communication option setting. Further, it should also be apparent to those skilled in the art that communication services options other than the preferred and discussed communication services and options can readily be controlled by the inventive computer-implemented control center. Irrespective of the services and options involved, a

subscriber can access the centralized computer-implemented control center through either a computer connected to the data-centric network or a telephone connected to the telephony-centric network to review and/or change the communication options.

FIG. 5 is a flow diagram depicting, in one embodiment, the relevant steps of a computer-implemented process for handling access to the unified messaging system through the telephony-centric network by a subscribing or a non-subscribing caller. The subscriber may wish to access the unified messaging system to, for example, listen to stored voice mail messages or e-mail messages, to use the unified messaging system as a calling card service, or to review and/or modify the communication options. A non-subscribing caller may access the unified messaging system to, for example, send a facsimile, a page, or to call the subscriber. The first step 502 involves accessing the unified message system through a telephone using the subscriber's assigned telephone number. A set of two numbers may be assigned to a user, a local telephone number and a toll-free telephone number, both of which may be associated with a single user account.

The dialed digits reaches telephony server 126 via telephone link 128. Telephony server 126 then obtains the DNIS (direct number information service) by digitizing the dialed digits (step 504) and employs the dialed digits to obtain the communication option settings associated with the account represented by the dialed telephone number (step 506). As mentioned earlier, these communication option settings reside in the subscriber communication profile database, which may be managed by database server 120, in one embodiment. During this time, telephone server 126, through an appropriate interface board such as the afore-mentioned Dialogic board, monitors the incoming line for a facsimile tone or telephone key digit tone.

If no such facsimile tone or telephone key digit tone is detected (step 508), the call is assumed to be a normal call to the subscriber and will be handled (in steps 510 and 512) in accordance with the communication option settings in the manner discussed earlier (e.g., forwarded if call forwarding is on, routed to an alternate number if the caller selects that option and alternate service is enabled, and the like).

On the other hand, if a facsimile tone is detected by telephony server 126, the call will be handled as an incoming facsimile in accordance with the communication option settings (step 514). By way of example, if the facsimile receiving service is enabled, a copy of the facsimile will be stored for later retrieval by the subscriber. If the facsimile forwarding option is enabled, a copy of the facsimile is alternatively or additionally sent to the forwarded facsimile number.

On the other hand, if a keyed digit tone is detected by telephony server 126, software within telephony server will handle the options chosen by the caller (step 516). By way of example, one option may represent the subscriber wishing to access the computer-implemented control center (via an appropriate key press) to review and/or change the communication options. In this case, telephony server 126 preferably serves up the account statistics, e.g., how many voice mail messages, facsimiles, e-mail messages, etc. are waiting and asks the caller for authentication as a subscriber. If there are none, the subscriber may wish to quickly hang up and not go through the authentication procedure (and extending the cost of the call). This, however, is an option and may be eliminated if privacy is a concern (that is, authentication may take place before the presentation of account statistics).

Telephony server 126 may then obtain the authentication data from the caller (e.g., the password) and compare it with the subscriber account authentication data, which it obtains from the subscriber communication profile database in the database server. Authentication may be done via keyed digit entry or, in one embodiment, by voice commands, which may then be translated to keyed digits by appropriate software. If authenticated, the subscriber may then be presented with a menu that allows the subscriber to review and/or change the communication options via key press or voice commands. Once the subscriber saves the changes, the changed communication option settings will be employed to handle future messages transmitted and/or received through either the telephony-centric network or the data-centric network.

As one of the options, the subscriber may be given a choice (with proper authentication) to use the unified messaging system to originate an outgoing call. The choice may be made via, for example, a predefined key press or voice command. This is useful in situations wherein the subscriber accesses his account at the unified messaging system through his toll-free number (e.g., from the airport or from someone else's telephone) and instructs the telephony server to connect his incoming call to an outgoing call to a provided destination telephone number and charges the cost to his account. In this manner, the unified messaging system may be employed as a convenient calling card.

A keyed digit may also represent an on-demand service selection chosen by the caller. In this case, the caller simply presses an appropriate key when prompted and employs one of the on-demand services is then employed to handle his call. Various on-demand services have been discussed in connection with FIGS. 3 and 4 and will not be repeated here for the sake of brevity.

FIG. 6 is a flow diagram depicting, in one embodiment, the relevant steps of a computer implemented process for handling access to the unified messaging system by a subscriber through a data-centric network (such as the Internet in the example of FIG. 6). The subscriber may wish to access the unified messaging system to, for example, listen to stored voice mail messages, view stored e-mail messages or facsimiles, send e-mail messages or facsimiles, or to review and/or modify the communication options. The first step 602 involves accessing the unified messaging system web site, using a unified messaging system web address (e.g., "unifiedmessagingsystem.com"), with user computer 100 through a data-centric network 102.

The web site request connects to the web server 122 via data link 104 and network interface system 105. Following connection to the web site, the unified messaging system web server 122 serves up a login page using, for example, ASP-active server pages (step 604). The next step (step 606) includes entering authentication data such as a subscriber identifier (ID), e.g., usemrname and password, at the login page. The web server 122, after obtaining the authentication data, compares it with the subscriber account authentication data (step 608), which it obtains from the subscriber communication profile database from the database server. If authenticated, the subscriber may then be presented with a graphical menu of the communication options (step 610) that allows the subscriber to retrieve his email/voicemail/fax messages, or review and/or modify the communication options via user computer 100 (step 612).

In one embodiment, a call is forwarded as long as the forwarding number is picked up. A variation of the approach is to forward the call only when the forwarding number is

picked up by a person. In this case, if the forwarding number is picked up by an answer machine or fax machine, the telephony server can analyze the tone and elect not to forward the call and simply provide the caller with other options including, for example, leaving a voice mail.

Once the subscriber saves the changes (step 614), the modified communication option settings will be employed to handle future messages transmitted and/or received through either the telephony-centric network or the data-centric network.

FIG. 7 is a flow diagram depicting the relevant steps of a computer implementer process for handling the routing of the call, if the call forwarding option of the unified messaging system is enabled. FIG. 7 is one technique for performing step 510 of FIG. 5. As mentioned in step 510, when the call is assumed to be a normal call to the subscriber, the call will be handled in accordance with the communication option settings. The first step 702 includes determining whether the call forwarding option is enabled. Preferably, the telephony server queries the database server for the communication option settings. If the call forwarding option is not enabled, the unified messaging system will determine if any other communication options are enabled (step 704). During this time, the unified messaging system will continue to monitor for facsimile and keyed digit tones (step 508). Step 508 is a parallel process as the telephony server is arranged to check for facsimile and keyed digit tones throughout the call.

On the other hand, if the call forwarding option is enabled the telephony server receives the forwarding number from the database server and initiates an outgoing call (step 706) to the forwarding number on another port (e.g., one of the outgoing lines as seen in FIG. 2). In one embodiment, software within the telephony server directs the Dialogic board to call the forwarding number and furnishes the forwarding number to the Dialogic board.

If the outgoing call is successfully connected to the telephony server (step 708), the telephony server then connects the port of the incoming call with the port of the outgoing call (step 710) to complete the end-to-end connection (step 712). By way of example, the software of the telephony server may, in one embodiment, directs the Dialogic board to connect the two ports together. Preferably, the call forwarding is deemed successful when the call is accepted, e.g., when the line is picked up at the forwarded number. Accepting the call can be in the form of keyed digit options requested by the telephony server or simply the connection itself.

On the other hand, if the outgoing call is not successfully connected, the telephony server may inform the caller of the failed connection (step 714) and may determine if any other communication options are enabled (step 704). In one embodiment, if other options are enabled, the call may be handled in accordance with these other communication options (step 716). At this time, the telephony server may offer other options to the caller such as on-demand services and when selected will route the call accordingly (818). On the other hand, if no options are enabled, the call ay be sent to voice mail (step 720).

Accordingly, the present invention provides a single centralized facility that gives a subscriber of various communication services (e.g., telephone, facsimile, pager, e-mail) the ability to review and modify his communication options (e.g., call forwarding, follow me service, alternate number, message alert, facsimile receiving, paging, routings and the like). This review and modification is done in an interactive and simplified manner, via either the data-centric network or the telephony-centric network.

The unified messaging system benefits a subscriber by integrating various communication services which up to now have existed as separate services. This is in sharp contrast to the prior art where the dual existence of the data-centric network and the telephony-centric network has forced the service providers to manage communication options as separate accounts.

This integration simplifies management, billing, and more importantly the routing of messages among the various services. The unified messaging system gives the subscriber more control with regards to how the world communicates to the subscriber. For example, a subscriber may specify that an incoming facsimile be forwarded to a computer for viewing or to a printer for printing, listen to e-mail messages through a telephone, receive pager notification when a facsimile is received, etc. The unified messaging system allows messages to be received, stored, retrieved, and/or forwarded without regard to the communication devices and/or networks employed for the transmission of the messages. In fact, the unified messaging system even gives non-subscribers choices with its on-demand services associated with some of the communication options.

The unified messaging system advantageously removes the burden of managing different physical devices and different accounts. The subscriber no longer has to access multiple accounts to modify options. As mentioned previously, a person who travels may wish to forward calls made from his home and office telephone numbers to his cellular telephone or hotel telephone. Likewise, he may wish to divert facsimiles sent to an office facsimile machine to a facsimile machine that is more local. While in a meeting, however, one may wish to temporarily divert the voice calls to a voice mail box or forwards it to another person for handling. To stay in touch, these communication options may need to be changed many times during the course of the day and/or each time one arrives at a new location.

Using the present invention, a person need only access the unified messaging system either with a telephone or a computer. The communication options may then be modified as needed with a few key strokes. The subscriber has the ability to review communication options at a single facility and no longer has to recall communication options from memory or contact each service provider.

Furthermore, the present invention advantageously allows remote access to the unified messaging system from any location that is connected to the data-centric network or the telephony-centric network. The subscriber no longer has to be physically present at the forwarding origin to modify the forwarding option. This advantage leads to yet another advantage in that the unified messaging system may be used as a calling card. The subscriber if located at the airport, for example, contacts his unified messaging system toll-free telephone number. The system then allows the subscriber the option of rerouting this call to another location.

Also, the present invention advantageously allows the subscriber the convenience of one telephone number (or two, including a toll-free 800 number). Multiple number confusion is avoided by connecting multiple numbers through the one number of the unified messaging system.

Yet another advantage of the present invention is a computer-implemented call forwarding option. That is, the call forwarding parameters may be reviewed and edited through any computer that is coupled to the data-centric network, even when the telephone sets themselves are

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implemented on the telephony-centric network. Of course, the use of the centralized control center also allows the subscriber to review and edit the call forwarding option parameters from any telephone set coupled to the telephony-centric network as well (as well as any computer that is configured to function as a phone set, i.e., a computer equipped with a speaker, microphone, and appropriate software to enable digital/Internet telephony).

Further, the call forwarding option presented substantially reduces the use of codes. The subscriber of the unified messaging system no longer has to remember or keep track of codes used for implementing and canceling call forwarding options. The call forwarding option also reduces the confusion associated with keeping track of which number a call is being forwarded since these parameters may be reviewed quickly and edited efficiently through the centralized control facility. Also, the call forwarding option offers a preprogrammed menu that stores a multiplicity of forwarding numbers. This greatly enhances the usability of the call forwarding option.

While this invention has been described in terms of several preferred embodiments, there are alterations, permutations, and equivalents which fall within the scope of this invention. By way of example, although some of the discussion has centered on voice call forwarding, it should be recognized that facsimile forwarding may be implemented in an analogous manner. It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the present invention. It is therefore intended that the following appended claims be interpreted as including all such alterations, permutations, and equivalents as fall within the true spirit and scope of the present invention.

What is claimed is:

1. A computer-implemented control center for permitting a subscriber of a unified messaging system to customize call forwarding parameters associated with a call forwarding service, said call forwarding service being configured to permit said subscriber to specify whether a call received at a telephone number associated with a given account of said unified messaging system be forwarded to a forwarding telephone number, said call forwarding parameters including a call forwarding enable option and said forwarding telephone number, said computer-implemented control center comprising:

a subscriber communication profile database, said subscriber communication profile database having therein said account pertaining to said subscriber, said account including said call forwarding parameters for said subscriber;

a computer server coupled to exchange data with said subscriber communication profile database, said computer server being configured to visually display said call forwarding parameters on a display terminal coupled to a data-centric network when said subscriber employs said display terminal to access said computer-implemented control center, said computer server also being configured to receive from said subscriber via said display terminal a first change to said call forwarding parameters and to update said first change to said account in said subscriber communication profile database, wherein subsequent calls to said given account are handled in accordance with parameters present in said subscriber communication profile database after said update; and

wherein when said call forwarding enable option is enabled and a call is received at the telephone number

associated with the given account of said unified messaging system, said computer server obtains digital data corresponding to a telephone signal associated with said received call, and said computer server automatically determines whether said received call is a voice call made to said associated telephone number or a facsimile call made to said associated telephone number on the basis of said obtained digital data, and automatically forwards said voice call, but not said facsimile call, to said forwarding telephone number.

2. The computer-implemented control center of claim 1 wherein said subsequent calls are made through a telephony-centric network different from said data-centric network.

3. The computer-implemented control center of claim 1 wherein said first change represents one of a disabling and an enabling of said call forwarding enable option.

4. The computer-implemented control center of claim 1 wherein said first change represents an edit of said forwarding telephone number.

5. The computer-implemented control center of claim 1 further comprising a telephony server coupled to exchange data with said communication profile database, said telephony server being configured to audibly represent said call forwarding parameters to a telephone set when said subscriber employs said telephone set to access said computer-implemented control center, said telephony server also being configured to receive from said subscriber via said telephone set a second change to said call forwarding parameters and to update said second change to said account in said subscriber communication profile database.

6. The computer-implemented control center of claim 5 wherein said telephony server includes an outgoing port and an incoming port, said incoming port representing a port through which said call is received, said outgoing port represents a port employed by said telephony server to initiate an outgoing call to said forwarding telephone number, wherein said forwarding is accomplished by coupling said incoming port to said outgoing port.

7. The computer-implemented control center of claim 6 wherein said incoming port is coupled to said outgoing port only if said outgoing call is successful.

8. The computer-implemented control center of claim 1 wherein the computer server comprises:

a database server coupled to exchange data with the subscriber communication profile database; and

a telephony server configured to receive the received call and to obtain said digital data corresponding to a telephone signal associated with said received call, said telephony server also being configured to communicate with said database server.

9. The computer-implemented control center of claim 8 wherein the telephony server determines if the telephone signal associated with the received call comprises an analog signal in which case said telephony server converts said telephone signal to the digital data.

10. The computer-implemented control center of claim 1 wherein the server automatically determines whether said received call is a voice call made to said associated telephone number or a facsimile call made to said associated telephone number on the presence of facsimile tone data identified in said obtained digital data.

11. A computer-implemented control center for permitting a subscriber of a unified messaging system to customize facsimile forwarding parameters associated with a facsimile forwarding service, said facsimile forwarding service being configured to permit said subscriber to specify whether a facsimile received at a telephone number associated with a

given account of said unified messaging system be forwarded to a forwarding telephone number associated with another facsimile receiver, said facsimile forwarding parameters including a facsimile forwarding enable option and said forwarding telephone number, said computer-implemented control center comprising:

a subscriber communication profile database, said subscriber communication profile database having therein said account pertaining to said subscriber, said account including said facsimile forwarding parameters for said subscriber;

a computer server coupled to exchange data with said subscriber communication profile database, said computer server being configured to visually display said facsimile forwarding parameters on a display terminal coupled to a data-centric network when said subscriber employs said display terminal to access said computer-implemented control center, said computer server also being configured to receive from said subscriber via said display terminal a first change to said facsimile forwarding parameters and to update said first change to said account in said subscriber communication profile database, wherein subsequent facsimiles to said given account are handled in accordance with parameters present in said subscriber communication profile database after said update; and

wherein when said facsimile forwarding enable option is enabled and a call is received at the telephone number associated with the given account of said unified messaging system, said computer server obtains digital data corresponding to a telephone signal associated with said received call, and said computer server automatically determines whether said received call is a voice call made to said associated telephone number or a facsimile call made to said associated telephone number on the basis of said obtained digital data, and automatically forwards said facsimile call, but not said voice call, to said forwarding telephone number.

12. The computer-implemented control center of claim 11 wherein said subsequent facsimiles are made through a telephony-centric network different from said data-centric network.

13. The computer-implemented control center of claim 11 wherein said subsequent facsimiles are made through said data-centric network.

14. The computer-implemented control center of claim 11 wherein said first change represents one of a disabling and an enabling of said facsimile forwarding enable option.

15. The computer-implemented control center of claim 11 wherein said first change represents an edit of said forwarding telephone number.

16. The computer-implemented control center of claim 11 further comprising a telephony server coupled to exchange data with said communication profile database, said telephony server being configured to audibly represent said facsimile forwarding parameters to a telephone set when said subscriber employs said telephone set to access said computer-implemented control center, said telephony server also being configured to receive from said subscriber via said telephone set a second change to said facsimile forwarding parameters and to update said second change to said account in said subscriber communication profile database.

17. The computer-implemented control center of claim 16 wherein said telephony server includes an outgoing port and an incoming port, said incoming port representing a port through which said facsimile is received, said outgoing port represents a port employed by said telephony server to

initiate an outgoing facsimile to said forwarding telephone number, wherein said forwarding is accomplished by coupling said incoming port to said outgoing port.

18. The computer-implemented control center of claim 17 wherein said incoming port is coupled to said outgoing port only if said outgoing facsimile is successful.

19. The computer-implemented control center of claim 11 further comprising a telephony server coupled to exchange data with said communication profile database, said telephony server including an outgoing port and an incoming port, said incoming port representing a port through which said facsimile is received, said outgoing port represents a port employed by said telephony server to initiate an outgoing call to said forwarding telephone number, wherein said forwarding is accomplished by coupling said incoming port to said outgoing port.

20. The computer-implemented control center of claim 19 wherein said incoming port is coupled to said outgoing port only if said outgoing call is successful.

21. The computer-implemented control center of claim 11 wherein the computer server comprises:

a database server coupled to exchange data with the subscriber communication profile database; and

a telephony server configured to receive the received call and to obtain said digital data corresponding to a telephone signal associated with said received call, said telephony server also being configured to communicate with said database server.

22. The computer-implemented control center of claim 21 wherein the telephony server determines if the telephone signal associated with the received call comprises an analog signal in which case said telephony server converts said telephone signal to the digital data.

23. The computer-implemented control center of claim 11 wherein the server automatically determines whether said received call is a voice call made to said associated telephone number or a facsimile call made to said associated telephone number on the presence of facsimile tone data identified in said obtained digital data.

24. A computer-implemented method for permitting a subscriber of a call forwarding service to customize call forwarding parameters associated with said call forwarding service, said call forwarding service being configured to permit said subscriber to specify whether a call received at a telephone number associated with a given account of said call forwarding service be forwarded to a forwarding telephone number, said call forwarding parameters including a call forwarding enable option and said forwarding telephone number, the method comprising:

providing a subscriber communication profile database, said subscriber communication profile database having therein said account pertaining to said subscriber, said account including said call forwarding parameters for said subscriber;

visually displaying said call forwarding parameters on a display terminal coupled to a data-centric network, using a computer server coupled to exchange data with said subscriber communication profile database, when said subscriber employs said display terminal to access said account;

receiving from said subscriber via said display terminal a first change to said call forwarding parameters, said first change to said call forwarding parameters pertains to at least one of said call forwarding enable option and said forwarding telephone number;

updating said first change to said account in said subscriber communication profile database, wherein sub-

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sequent calls to said given account are handled in accordance with parameters present in said subscriber communication profile database after said update;

receiving a call made to said associated telephone number;

obtaining digital data corresponding to a telephone signal associated with said received call made to said associated telephone number;

ascertaining whether the call made to said associated telephone number represents a facsimile call or a voice call on the basis of said obtained digital data; and

forwarding the call made to said associated telephone number to the forwarding telephone number only if the call made to said associated telephone number is a voice call and said call forwarding option is enabled.

25. The computer-implemented method of claim 24 wherein obtaining digital data corresponding to said telephone signal associated with said received call comprises determining whether the telephone signal comprises an analog signal in which case the telephone signal is converted to digital data corresponding to the telephone signal.

26. The computer-implemented method of claim 24 wherein said subsequent calls are made through a telephony-centric network different from said data-centric network.

27. The computer-implemented method of claim 26 wherein said data-centric network represents the Internet.

28. The computer-implemented method of claim 24 further comprising

providing a telephony server coupled to exchange data with said communication profile database, said telephony server being configured to audibly represent said call forwarding parameters to a telephone set when said subscriber employs said telephone set to access said computer-implemented control center, said telephony server also being configured to receive from said subscriber via said telephone set a second change to said call forwarding parameters and to update said second change to said account in said subscriber communication profile database.

29. The computer-implemented control center of claim 28 wherein said telephony server includes an outgoing port and

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an incoming port, said incoming port representing a port through which said call is received, said outgoing port represents a port employed by said telephony server to initiate an outgoing call to said forwarding telephone number, wherein said forwarding is accomplished by coupling said incoming port to said outgoing port.

30. A computer-implemented method for handling routing of a telephone call, the method comprising:

receiving a telephone call;

obtaining digital data corresponding to a telephone signal associated with the received telephone calls

determining whether the received telephone call is a facsimile call or a non-facsimile call on the basis of the obtained digital data; and

forwarding the received telephone call to a first forwarding telephone number only if the received telephone call is a non-facsimile call and a non-facsimile forwarding option is enabled.

31. The method of claim 30 wherein obtaining digital data corresponding to the telephone signal associated with the received telephone call comprises determining whether the telephone signal comprises an analog signal in which case the telephone signal is converted to digital data corresponding to the telephone signal.

32. The method of claim 30 further comprising forwarding the received telephone call to a second forwarding telephone number if the received telephone call is a facsimile call and a facsimile forwarding option is enabled.

33. The method of claim 30, further comprising receiving a facsimile message associated with the received telephone call if the received telephone call is a facsimile call.

34. The method of claim 33 further comprising forwarding the received facsimile message to a second forwarding telephone number having facsimile receiving capability if the received telephone call is a facsimile call and a facsimile forwarding option is enabled.

35. The method of claim 30 wherein the method is implemented in a unified messaging system.

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